IN THE CLAIMS

Please substitute the claim set in the appendix entitled Clean Version of Pending Claims for the previously pending claim set. The substitute claim set is intended to reflect amendment of previously pending claims 21, 23-25, and 39-41. The specific amendments to individual claims are detailed in the following marked up set of claims.

21. (Once Amended) A charge pump, comprising:

an oscillator to generate a first and a second phase during a phase cycle;

first and second primary phase generators coupled to the oscillator;

first and second secondary phase generators coupled to the first and second primary phase generators, respectively;

first and second preboot capacitors coupled to the first and second primary phase generators, respectively;

a first main pump capacitor coupled to the first secondary phase generator, and the first preboot capacitor;

a second main pump capacitor coupled to the second secondary phase generator, and the second preboot capacitor;

a first and second p-channel gates coupled to the first and second main pump capacitors, respectively;

wherein the first main pump capacitor is prebooted to a first pre-determined level by the [second] first preboot capacitor during the first phase, wherein the first pre-determined level moves to a second pre-determined level during the second phase in response to the first primary phase generator, wherein the second predetermined level moves to a third predetermined level in response to the first secondary phase generator, and wherein the third predetermined level dumped to a first p-channel gate during the first phase; and

wherein the second main pump capacitor is prebooted to a first pre-determined level by the [first] second preboot capacitor during the second phase, wherein the first predetermined level moves to a second pre-determined level during the first phase in response to the second primary phase generator, wherein the second predetermined level moves to a third predetermined

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level in response to the second secondary phase generator, and wherein the third predetermined level dumped to a second p-channel gate during the second phase.

23. (Once Amended) A two-phase integrated circuit charge pump, comprising:

an oscillator, where the oscillator generates an oscillating signal during a phase cycle including a first and a second phase;

a primary phase generator, coupled to the oscillator, wherein the primary phase generator generates a first phase signal and a second phase signal that are non-overlapping and crossing each other around high points of their signals during a phase cycle, further the primary phase generator gencrates a third phase signal and a fourth phase signal that are non-overlapping and crossing each other around low points of their signals during every phase cycle, and further the primary phase generator generates a seventh phase signal and an eighth phase signal;

a secondary phase generator, coupled to the primary phase generator, wherein the secondary phase generator receives the first and second phase signals and generates a fifth phase signal and a sixth phase signal that are non-overlapping and crossing each other around high points of their signals during a phase cycle and includes a predetermined delay from the first and second phase signals;

a first and second pre-boot precharge capacitors, coupled to the primary phase generator, wherein the first and second pre-boot precharge capacitors receive the third and fourth phase signals from the primary phase generator during the first and second phases respectively;

a first and second pre-boot capacitors, coupled to the primary phase generator and the first and second pre-boot precharge capacitors respectively, receives the first and second phase signals from the primary phase generator respectively, and wherein the first and second pre-boot precharge capacitors pre-charges the first and second pre-boot capacitors to a pre-determined level during the first and second phases respectively;

a first and second main pump precharge capacitors, coupled to the primary phase generator, wherein the first and second main pump precharge capacitors receive the seventh and eighth phase signals from the primary phase generator during the first and second phases respectively;

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a first main pump capacitor, coupled to the first main pump precharge capacitor, the second pre-boot capacitor, and the secondary phase generator, wherein the first [second] pre-boot capacitor pre-boots the first main pump to a predetermined booted level during the first phase, further the first main pump precharge capacitor precharges the first main pump capacitor to a second pre-determined level during the second phase and further the first main pump capacitor receives the fifth phase signal from the secondary phase generator during the first phase, and where the first main pump capacitor goes to a third predetermined level and outputs a charge to a first p-channel gate during the first phase; and

a second main pump capacitor, coupled to the second main pump precharge capacitor, the first pre-boot capacitor, and the secondary phase generator, wherein the second [first] pre-boot capacitor pre-boots the second main pump to a predetermined booted level during the second phase, further the second main pump precharge capacitor precharges the second main pump capacitor to a second pre-determined level during the first phase, and further the second main pump capacitor receives the sixth phase signal from the secondary phase generator during the second phase, and where the second main pump capacitor goes to the third predetermined level and outputs the charge to a second p-channel gate during the second phase.

24. (Once Amended) A two-phase charge pump for producing a pump voltage on an output line, comprising:

an oscillator, where the oscillator generates an oscillating signal;

a primary phase generator, coupled to the oscillator, generates a first phase signal and a second phase signal that are non-overlapping and crossing each other around high points of their signals during every phase cycle (consisting of a first phase and a second phase), further the primary phase generator generates a third phase signal and a fourth phase signal that are non-overlapping and crossing each other around low points of their signals during every phase cycle, and further the primary phase generator generates a seventh phase signal and a eighth phase signal;

a delay element, coupled to the primary phase generator, receives the first and second phase signals and generates a fifth phase signal and a sixth phase signal that are non-overlapping

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and crossing each other around high points of their signals during every phase cycle and includes a predetermined delay from the first and second phase signals;

a first and second pre-boot precharge circuitry, coupled to the primary phase generator, receives the third and fourth signals from the primary phase generator during a first and second phases respectively;

a first and second pre-boot circuitry, coupled to the primary phase generator and the first and second pre-boot precharge capacitors respectively, receives the first and second phase signals from the primary phase generator respectively, and where the first and second pre-boot precharge circuitry pre-charges the first and second pre-boot capacitors to a pre-determined level during the first and second phases respectively;

a first and second main pump precharge circuitry, coupled to the primary phase generator receives the seventh and eighth phase signals from the delay element during the first and second phases respectively;

a first main pump circuitry, coupled to the first main pump precharge circuitry, the first [second] pre-boot circuitry, and the delay element, where the [second] first pre-boot circuitry pre-boots the first main pump circuitry to a predetermined booted level during the first phase, further the first main pump precharge circuitry precharges the first main pump circuitry to a second pre-determined level during the second phase and further the first main pump circuitry receives the fifth phase signal from the delay element during the first phase, and where the first main pump circuitry goes to a third predetermined level and outputs a charge to a first p-channel gate during the first phase; and

a second main pump circuitry, coupled to the second main pump precharge circuitry, the second [first] pre-boot circuitry, and the delay element, where the [first] second pre-boot circuitry pre-boots the second main pump to a predetermined booted level during the second phase, further the second main pump precharge circuitry precharges the second main pump circuitry to a second pre-determined level during the first phase, and further the second main pump circuitry receives the sixth phase signal from the delay element during the second phase, and where the second main pump circuitry goes to the third predetermined level and outputs the charge to a second p-channel gate during the second phase.

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25. (Once Amended) A charge pump circuit, comprising:

a phase generator to generate a first phase and a second phase, wherein the first phase is 180 degrees out of phase with respect to the second phase;

a primary phase generator, coupled to the oscillator, generates a first phase signal and a second phase signal that are non-overlapping and crossing each other around high points of their signals during every phase cycle (consisting of a first phase and a second phase), further the primary phase generator generates a third phase signal and a fourth phase signal that are non-overlapping and crossing each other around low points of their signals during every phase cycle, and further the primary phase generator generates a seventh phase signal and a eighth phase signal;

a secondary phase generator, coupled to the primary phase generator, receives the first and second phase signals and generates a fifth phase signal and a sixth phase signal that are non-overlapping and crossing each other around high points of their signals during every phase cycle and includes a predetermined delay from the first and second phase signals;

a first and second pre-boot precharge capacitors, coupled to the primary phase generator, receives the third and fourth signals from the primary phase generator during a first and second phases respectively;

a first and second pre-boot capacitors, coupled to the primary phase generator and the first and second pre-boot precharge capacitors respectively, receives the first and second phase signals from the primary phase generator respectively, and where the first and second pre-boot precharge capacitors pre-charges the first and second pre-boot capacitors to a pre-determined level during the first and second phases respectively;

a first and second main pump precharge capacitors, coupled to the primary phase generator receives the seventh and eighth phase signals from the primary phase generator during the first and second phases respectively;

a first main pump capacitor, coupled to the first main pump precharge capacitor, the [second] first pre-boot capacitor, and the secondary phase generator, where the [second] first pre-boot capacitor pre-boots the first main pump to a predetermined booted level during the first phase, further the first main pump precharge capacitor precharges the first main pump capacitor

to a second pre-determined level during the second phase and further the first main pump capacitor receives the fifth phase signal from the secondary phase generator during the first phase, and where the first main pump capacitor goes to a third predetermined level and outputs a charge to a first p-channel gate during the first phase; and

a second main pump capacitor, coupled to the second main pump precharge capacitor, the [first] second pre-boot capacitor, and the secondary phase generator, where the [first] second pre-boot capacitor pre-boots the second main pump to a predetermined booted level during the second phase, further the second main pump precharge capacitor precharges the second main pump capacitor to a second pre-determined level during the first phase, and further the second main pump capacitor receives the sixth phase signal from the secondary phase generator during the second phase, and where the second main pump capacitor goes to the third predetermined level and outputs the charge to a second p-channel gate during the second phase.

39. (Once Amended) A method of producing a pump supply voltage from an integrated circuit two phase charge pump, comprising:

generating an oscillating signal;

generating a first and second phase signals that are non-overlapping and crossing each other around high points of their signals during every phase cycle from the oscillating signal by a primary phase generator;

generating a third and fourth phase signals that are non-overlapping and crossing each other around low points of their signals during every phase cycle from the oscillating signal by the primary phase generator;

generating a fifth and sixth phase signals having a predetermined delay from the first and second phase signals that are non-overlapping and crossing each other around high points from the first and second phase signals received from the primary phase generator by a secondary phase generator;

generating a seventh and eighth phase signals by the primary phase generator;

recharging a first pre-boot capacitor to a first pre-determined level using the first and third phase signals during the first phase;

recharging a second pre-boot capacitor to the first pre-determined level using the second and fourth phase signals during the second phase;

pre-booting a first main pump capacitor to the pre-determined boot level by the [second] first pre-boot capacitor during the first phase;

pre-booting a second main pump capacitor to a pre-determined boot level by the [first] second pre-boot capacitor during the second phase;

pre-charging the first main pump capacitor to a second pre-determined level by the seventh phase signal during the second phase;

inputting the fifth phase signal to boost the first main pump to a third pre-determined level during the first phase;

outputting the first main pump charge to a first p-channel gate during the first phase;

outputting the charge from the first p-channel gate to a V_{ccp};

pre-charging the second main pump capacitor to the second pre-determined level by the eight phase signal during the first phase;

inputting the sixth phase signal to boost the second main pump to the third pre-determined level during the second phase;

outputting the second main pump charge to a second p-channel gate during the second phase; and

outputting the charge from the second p-channel gate to a V_{ccp}.

40. (Once Amended) A method of producing a pump supply voltage from an integrated circuit two phase charge pump, comprising:

generating an oscillating signal;

generating a first and second phase signals that are non-overlapping and crossing each other around high points of their signals during every phase cycle from the oscillating signal by a primary phase generator;

generating a third and fourth phase signals that are non-overlapping and crossing each other around low points of their signals during every phase cycle from the oscillating signal by the primary phase generator;

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generating a fifth and sixth phase signals having a predetermined delay of approximately in the range of about 10 to 30 nanoseconds from the first and second phase signals that are non-overlapping and crossing each other around high points from the first and second phase signals received from the primary phase generator by a secondary phase generator;

generating a seventh and eighth phase signals by the primary phase generator;

recharging a first pre-boot capacitor to a first pre-determined level of approximately in the range of about 1 to 5 volts using the first and third phase signals during the first phase;

recharging a second pre-boot capacitor to the first pre-determined level of approximately in the range of about 1 to 5 volts using the second and fourth phase signals during the second phase;

pre-booting a first main pump capacitor to the pre-determined boot level of approximately in the range of about 1 to 5 volts by the [second] first pre-boot capacitor during the first phase;

pre-booting a second main pump capacitor to a pre-determined boot level of approximately in the range of about 1 to 5 volts by the [first] second pre-boot capacitor during the second phase;

pre-charging the first main pump capacitor to a second pre-determined level of approximately in the range of about 1 to 5 volts by the seventh phase signal during the second phase;

inputting the fifth phase signal to boost the first main pump to a third pre-determined level of approximately in the range of about 1 to 5 volts during the first phase;

outputting the first main pump charge to a first p-channel gate during the first phase;

outputting the charge from the first p-channel gate to a V_{ccp};

pre-charging the second main pump capacitor to the second pre-determined level approximately in the range of about 1 to 5 volts by the eight phase signal during the first phase;

inputting the sixth phase signal to boost the second main pump to the third pre-determined level of approximately in the range of about 1 to 5 volts during the second phase;

outputting the second main pump charge to a second p-channel gate during the second phase; and

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outputting the charge from the second p-channel gate to a V_{ccp}.

41. (Once Amended) A method of producing a pump supply voltage in an integrated circuit, the method, comprising:

generating an oscillating signal;

generating a first and second phase signals that are non-overlapping and crossing each other around high points of their signals during every phase cycle from the oscillating signal by a primary phase generator;

generating a third and fourth phase signals that are non-overlapping and crossing each other around low points of their signals during every phase cycle from the oscillating signal by the primary phase generator;

generating a fifth and sixth phase signals from the first and second phase signals, where the fifth and sixth phase signals are similar to the first and second phase signals, and having a predetermined delay from the first and second phase signals by a secondary phase generator;

generating a seventh and eighth phase signals by the primary phase generator;

recharging a first pre-boot capacitor to a first pre-determined level using the first and third phase signals during the first phase;

recharging a second pre-boot capacitor to the first pre-determined level using the second and fourth phase signals during the second phase;

pre-booting a first main pump capacitor to the pre-determined boot level by the [second] first pre-boot capacitor during the first phase;

pre-booting a second main pump capacitor to a pre-determined boot level by the [first] second pre-boot capacitor during the second phase;

recharging the first main pump capacitor to a second pre-determined level by the seventh phase signal during the second phase;

inputting the fifth phase signal to raise the first main pump to a third pre-determined level during the first phase;

outputting the first main pump charge to a V_{ccp} during the first phase;

pre-charging the second main pump capacitor to the second pre-determined level by the

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